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Description

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Method for conveying information between a switching office and a communications terminal

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The invention also relates to a method for transmitting data to operators of a telecommunications network which are members of an operator service, the data being specifically for the operator service, and at least one data channel and at least one call channel being available for each link.

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The invention also relates to a telecommunications network having a plurality of switching offices, in which telecommunications network operators which are members of an operator service are connected to at least one switching office, and each switching office has at least one coordination processor and peripheral line trunk groups with a group processor for the subscribers.

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What are referred to as operator services which constitute an essential link between the customers of the network and the network operators are required in telephone networks. Such an operator service has diverse functions, one main function being to distribute information to subscribers on request. For example, a subscriber may call an operator service in an ISDN network and request information. The respective operator can then, if necessary, access a database, for example, in which case information relating to another subscriber is then provided to him on the screen of a PC. After a connection request by the operator, which can be effected for example by pressing a push-button key, the operator is connected to the searched-for subscriber. The operator is then connected back to the originating subscriber and to the searched-for subscriber and can optionally speak to one of the

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subscribers. Signaling on the D channel then takes place again at the push of a further push-button key, and the

connection situations of the two subscribers of the peripheral line trunk group are indicated, and the call channels are connected via the switching matrix so that ultimately there is a direct link between the two subscribers. The example described here is intended to represent just one of the possibilities or functions of an operator service.

Larger networks with a larger number of subscribers require a correspondingly large number of operator service systems with a large number of usually hierarchically structured system subscribers (operators), such as, for example, as in the case of the Applicant's system which is called ADMOSS. Messages from the operators to a switching office are sent, as already mentioned, in the D channel in an ISDN network, specifically in a point-to-point configuration with a permanently active layer 2 of the OSI layer model. The messages are transmitted in an ISDN network with the support of the D channel protocol, for which reason reference is also made to the Blue Book, Volume VI - Fascicle VI. 11, "Digital Subscribe Signalling System No. 1 (DSS1), Network Layer, User-Network Management", Recommendations Q. 930 - Q. 940, in particular to Recommendation Q. 931.

The operators are usually located in what are referred to as call centers, and a respective device, composed of a terminal, PC, screen etc. and referred to below, as is the usual practice, as "console" is directly connected to the system and/or can be connected to the local switching office. However, the need to use decentralized operators, for example within the context of homeworkers, is being increasingly felt, but a single central management system for the operators in the network should still be possible.

The PC of each operator has software installed which is suitable for the operator service, but when the operator logs on, i.e. the console is respectively first put into operation, data from the carrier is also  
5 required. In such a case, the operator logs on by inputting his password and his ID numbers and specific data is then

loaded onto the console ("downloading") by the carrier, this data being for example the system clock times and data, the hierarchy structure, personal data and different rights, for example access possibilities to statistical data etc. If the operator is a supervisor, i.e. a high-ranking member in the hierarchy, he will also obtain access to tables which provide information on the working status of other operators etc.

One object of the invention is to disclose a method which permits the aforesaid specific information, which will be available in a centrally stored form, to be loaded to operator consoles which may be situated at any desired location in a network, without complex changes to existing systems being required.

US-A-5,469,504 describes a call distributor system having a host computer together with a database which is physically connected to all the switching offices, and serves as a system for switching and/or conveying the data between the individual switching offices to which operators of an operator service are connected. In this system, a call link is firstly offered to an operator via the local switching office and, if the operator is not suitably located for this call, this call is transferred to a further operator using the host computer, this transfer being made using a special protocol, referred to in the document as "intertandem protocol". This protocol uses a DTMF method. The expenditure incurred as a result of the use of the host computer in conjunction with the X.25 interface protocol described in the document and the intertandem protocol is, however, to be considered as disadvantageous.

This object is achieved with a method of the type mentioned at the beginning in which, according to the

invention, after an operator logs onto a remote master office in which the specific

data for the operator service are present centrally, a request is transmitted by the coordination processor of the master office to a virtual operator set up in a peripheral line trunk group in order to initiate a dialing process to the operator, after which a link setup to the subscriber is carried out via a call channel and a corresponding message is transmitted to the coordination processor, the data to be transmitted are then loaded in the master office from the coordination processor into a group processor, a data transmission link in the master office is set up starting from this group processor to a peripheral line trunk group for fast data links, and the data to be transmitted is then transmitted via a data link to a peripheral line trunk group for fast data links between the switching office of the operator and from there, within the switching office, to the peripheral line trunk group (LTG) of the operator, and finally the data to be transmitted is transmitted from this peripheral line trunk group to the operator (OP1).

Thanks to the invention, operators which are also connected to different switching offices of a communications network can receive specific, centrally managed data, this loading of data not necessarily having to be restricted to the initialization phase when logging on is performed.

It is expedient if the data to be transmitted is transmitted from the peripheral line trunk group to the operator via a data channel, this constituting the customary possibility for the data transmission, which also should be provided in the network in accordance with regulations.

However, because, on the other hand, a call connection is set up according to the invention, it may also be appropriate if the data to be transmitted is

transmitted via the set-up call channel using a data link program.

In order to take into account the dynamics and the resources of the group processor of the master office, an indication is given if the data from the coordination processor of the master office is loaded  
5 into the group processor in blocks of limited size via an existing data link interface.

The invention is particularly suitable for applications in an ISDN network, the data channel being the D  
10 channel, and the call channels being B channels. In this case, the inter-office signaling system is advantageously an ISUP signaling system.

The object of the invention is also achieved with a  
15 telecommunications network of the type specified at the beginning, in which, according to the invention, a virtual operator is set up in a peripheral line trunk group of a switching office serving as master office, and is provided for transmitting data from the  
20 coordination processor of the master office to an operator of the operator service, and the coordination processor of the master office is configured to transmit a request to the virtual operator, and to initiate a dialing process to the operator so that the  
25 data to be transmitted can be transmitted, after setting up of a data transmission link within the master office, via a peripheral line trunk group for fast data links of the master office to such a line trunk group of the switching office of the operator and  
30 can be transmitted from this switching office to the operator.

The advantages which can be achieved in this way and those which are related to the features of the  
35 dependent claims 8 to 12 correspond to the advantages mentioned in conjunction with the method and the invention.

The invention, together with further advantages, is explained in more detail below with reference to an exemplary embodiment and by means of the drawing. The latter shows in its single

figure the basic structure of a network with two switching offices illustrated and an operator service.

At the top left of the figure there are a number of  
5 operators OP1, OP2 ... of an operator service OPS,  
details of the hierarchy within the operators OP1, OP2  
... not being given here. All operators OP1, OP2 ...  
are next to customary network operators TEI of a  
telecommunications network NET, of an ISDN network in  
10 the present case, and are therefore connected into the  
network via an  $S_0$  interface, i.e. each connected here  
to a network terminal NTE.

A first switching office VS1 of the network is shown  
15 top right and it has, in a manner known per se, a  
switching matrix SNE and periphery line trunk groups  
LTG, LTC connected thereto. A coordination processor  
COP is provided for controlling the switching office  
VS1, especially the switching matrix SNE. Each  
20 peripheral line trunk group LTG, LTC also contains, in  
a known manner, a group processor GRP, and in this  
exemplary embodiment concentrators DLU (Digital Line  
Unit) are connected to each peripheral line trunk group  
via a  $U_{k0}$  interface. Each of these concentrators DLU  
25 also has a plurality of inputs for the network  
terminals already mentioned above. In the case of  
relatively large switching offices, up to 512  
peripheral line trunk groups LTG, LTC can be connected  
to a switching matrix SNE, and usually two  
30 concentrators DLU are connected to each line trunk  
group LTG. The peripheral line trunk groups LTG, LTC  
each also contain, in a known manner, what is referred  
to as a group switch GSI.

35 In a peripheral line trunk group LTG, LTC, various  
programs are executed which are supported by the group  
processor GRP, for example the greater part of the  
connection setup, the signaling, the code reception

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etc. takes place here. In general, 70% of the connection setup is carried out in the peripheral

line trunk groups, whereas especially routing functions are assigned to the coordination processor COP.

5 The switching office also comprises an operation and maintenance system OMS with an operation and maintenance terminal OMT at which monitoring personnel can continuously monitor the state of the switching office and detect faults.

10 The operators OP1, OP2 ... of the operator service OPS usually have workstations with personal computers which contain ISDN cards and special software as well as headsets for the operators. The operators OP1, OP2, ...  
15 especially to the peripheral line trunk groups LTG, these messages being processed in the group processor GRP and devised to corresponding further measures, for example a connection setup. The messages are transmitted in a point-to-point configuration with a  
20 permanently active layer 2 and in the D channel in an ISDN network.

Bottom right in the drawing there is a further switching office VS2 which is associated with the  
25 network NET and whose setup corresponds basically to the first switching office VS1, but the second switching office VS2 serves as a master office above the operator service. Of course, a large number of other switching offices (not shown here) may also be  
30 provided as a function of the size of the network.

Each switching office VS1, VS2 has a particular peripheral line trunk group LTC for fast data links which permit data exchange, within the scope of inter-  
35 office signaling, for example in the ISUP signaling system (see for example P. Bocker, ISDN - Digitale Netze für Sprach-, Text-, Daten-, Video- und Multimediakommunikation [Digital Networks for Call,

Text, Data, Video and Multimedia Communication], 4th  
Edition, Springer [Publishing house], Section 6.2.9,  
"Zwischenamtsignalisierung" [Inter-office signaling]),  
with other such

line trunk groups via rapid data links, for example optical fiber lines.

5 In the present case, that data which is to be loaded into the consoles of the operators OP1, OP2, ... may be in the remote office, i.e. the switching office VS2, namely in its coordination processor COP. In order to transmit the aforesaid data which is specifically for the operator service and which is composed, for  
10 example, of tables for the function of the console, to the operator OP1, the invention provides a method described in more detail below.

15 Firstly, the operator OP1 logs on with a password and an ID number to the remote switching office VS2, the master office, which is however not a subject of the present invention. In principle after the operator OP1 logs onto the remote switching office VS2, the coordination processor COP of the master office VS2  
20 transmits a request to a virtual operator VOP to initiate a dialing process to the operator OP1. Such a virtual operator, which is set up in a peripheral line trunk group LTG, is required by the coordination processor COP in order to be able to set up a call  
25 link. In fact, a connection setup is then carried out starting from the virtual operator VOP, to the operator OP1 via a call channel, here a B channel, and after the successful connection setup the coordination processor COP is also informed of the call status and also  
30 informed in the event of a disconnection of the link.

The corresponding program part then initiates, given a successful setup of a link, a data link connection from a PC or the like to the coordination processor, a  
35 corresponding identification of this new type of link, which can also be referred to as a "remote downloading" link, being used. The data is then loaded, for example, in blocks of four kbytes into a group processor GRP by

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the coordination processor

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by means of the existing data link interface. A data transmission link RIN (Report Interface) in the master office VS2 is then set up starting from this group processor GRP to a peripheral line trunk group LTC.

5 This line trunk group LTC is used for fast data links to other offices, the data to be transmitted then being transmitted via a fast data link, for example an optical fiber cable, to a corresponding peripheral line trunk group LTC of the switching office VS1 of the

10 subscriber OP1, from here within the switching office VS1 to the peripheral line trunk group LTG of the subscriber, and finally the data to be transmitted are transmitted from this peripheral line trunk group LTG to the operator OP1 and loaded there. The transmission

15 from the peripheral line trunk group LTG of the operator OP1 to the latter is made via a D channel in which a data link to the console is set up. However, it is also possible to load the further data into the console via a B channel link, for which purpose a

20 corresponding data transmission protocol has to be employed for using the B channel as a data transport medium. After all the data has been transmitted, the data link connection is released and finally the existing call between the operator OP1 and the vertical

25 operator is also released from the console.

It is to be noted that the loading of data does not necessarily have to have its starting point in a request of the operator OP1, but a link from the master

30 office to the operator OP1 can instead also be made at the request of the operator service using the virtual operator VOP. Of course, all this presumes that the call numbers of the corresponding operators OP1, OP2, ... are known to the master office VS2. In this

35 context, it is necessary to set up a call for addressing purposes, and the data can then, as already mentioned, either be transmitted over the D channel at 16 kbit/s in the case of ISDN or even

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over a B channel with an even higher speed, namely 64 kbit/s in the case of ISDN. The invention therefore permits

a significant expansion of an operator service because  
the latter can be integrated into a large network with  
a multiplicity of switching offices (only two are shown  
in the drawing for the sake of simplification), and  
5 nevertheless centralized and clearly organized  
management is possible. The data loaded into the  
console also makes it possible to take into account the  
hierarchy in the operator service which is mentioned at  
the start, so that higher-ranking operators can receive  
10 preferred data which is not to be made available to all  
operators.

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